On the possibility of constructing devices capable of extracting energy from the forces of nature

S. K. Ghoshal, Madhusree Kole

Abstract- **The possibility of constructing new kinds of energy-generating machines by making use of the magnetic, buoyant, and electrostatic forces has been explored. A simple device capable of extracting energy from the permanent magnets has been fabricated. It makes use of both the attractive and repulsive forces between the pole-pieces of an electromagnet and those of a set of permanent magnets in sequential order to impart a unidirectional motion to a disc rotor along the rim of which pole-pieces of the permanent magnets are fixed pair-wise with regular spacing. The possibility of energy extraction by making use of antigravity forces has been demonstrated by another working device. The working of the contraption is based on the buoyant forces experienced by a float with the rise of water level in a tank, and translating this movement of the float into useful work through a lever and a crank-shaft system. Charging metal plates through electrostatic induction and subsequent discharging of the charged plates to generate electricity has been the basic principle of the third type of energy generating unit. The construction and working of these devices as well as their limitations and future prospects are discussed in this paper.**

***Index terms*- energy extraction, permanent magnets, antigravity buoyant force, electrostatic induction.**

I. INTRODUCTION

The concept of energy is the most central concept in science perhaps. The most remarkable feature of the energy-concept is its inter-convertibility between various forms. Material bodies in motion, heat, electromagnetic radiation, electricity, magnetic fields are the phenomena that embody energy, all of which can be converted into other forms, and most importantly, into useful work. The doctrine that governs such conversion of one form of energy into another is the "principle of conservation of energy". There exists a bewildering variety of sources of energy in nature.

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Gravitational energy, solar energy, energy of an electric current, energy stored in an electric or a magnetic field, atomic energy, energy stored in fuels, food staffs and other chemicals to name a few. In modern era scientists and technologists not only have invented hundreds of varieties of energy-generating machines and devices but also directed their efforts to find out newer sources of energy or to bring about improvement in the performance of the machines with ever-increasing efficiency through skillful applications of the energy ideas.

Unfortunately, our technological powers are confronted by an almost insurmountable limitation. The frictional forces in the cases of mechanical machine systems, the wasteful processes in heat engines and the ever-opposing Lenz's law as in the cases of electrical machines (viz., motors, generators, transformers) come into play thwarting our efforts to achieve perfect (100%) energy efficiency.

Fortunately, nature has been so generous in rendering to the mankind her greatest gift, some inexhaustible sources of energy but in a subtle way. Such sources of energy are the forces of nature: the gravitational forces, magnetic forces, and the electrostatic forces. The earth's gravitational forces are eternal and inexhaustible, so do the attractive and repulsive forces between the charged bodies in the sense that charged particles are eternal and indestructible. The attractive and repulsive forces between the pole-pieces of permanent magnets, though not eternal in true sense, but could be made very powerful and long-lived. These natural forces or the sources of energy are independent of the dictum of the laws of thermodynamics, and hence, from the law of conservation of energy (which stems from the laws of thermodynamics), and are also free from the influence of the Lenz's law. If these inexhaustible sources of energy are skillfully harnessed for energy generation by constructing devices and machines appropriate for the purpose, it may prove to be a great step towards solving the energy crisis that our modern society is going to face in near future.

Driven by this viewpoint, we undertook project works to explore the possibility of constructing simple models of some devices capable of extracting energy from the aforesaid forces of nature. We designed and fabricated a few of the prototype working models of such devices in our laboratory. Preliminary reports of the design and working of some of these models have already been presented in a National Conference [1, 2] The details of the design, the principle of the techniques and the shortcomings that the models suffer, as well as the possible improvements that could be carried out to construct larger-size machines

capable of generating energy for useful purposes, have been discussed in this article.

II. CONSTRUCTION OF A DEVICE CAPABLE OF EXTRACTING ENERGY FROM PERMANENT MAGNETS

A powerful permanent magnet can be considered to be a storehouse of unlimited energy in the sense that it can keep on exerting attractive and repulsive forces on pole-pieces of other magnets or magnetic materials (and thereby doing work) repetitively without losing significantly any of its attractive or repulsive power. This remarkable ability of the magnets to influence motion at a distance without any apparent energy source has long appeal to inventors. It is tempting to support that there must be some way of arranging and extracting energy from them. In fact a review of the literature [3-5] reveals that there have been many attempts for over a century by many inventors primarily focusing their efforts to fabricate perpetual motion machines by making use of either the attractive or repulsive forces of the permanent magnets. Unfortunately, no inventors have ever been entirely successful in making such devices.

The lesion that we have learnt is that in order to build such machines harnessing magnetism, it is necessary that one should make use of both the attractive and repulsive forces of the magnets in sequential order so as to impart a unidirectional motion to the moving part of the machine. In order to achieve this, we need to have a combination of both electromagnets and permanent magnets arranged in a particular way.

A schematic diagram of the home-built device is shown in Figure 1. It consists of sixteen pieces of U-shaped permanent magnets (~1000 gauss) rigidly fixed with regular spacing in between two circular Bakelite discs constituting the rotor. The slightly convex surfaces of the pole-pieces of the magnets almost match the curvature of the rim of the rotor. The rotor can freely rotate in a vertical plane about an axle which also houses a switching device. The switching device is made up of a thick circular Teflon disc. On the rim of it sixteen copper wires are embedded. These wires are electrically connected to the brass axle of the rotor and an adjustable electrical contact point which can slide over the Teflon disc and makes the electrical circuit close when come in contact with the wire. A U-shaped electromagnet having laminated iron core is rigidly fixed at position below the bottom level of the rim of the rotor with its pole-pieces in close proximity of the pole-pieces of the permanent magnets. The coils of the electromagnet are connected to a 24 Vbattery through the switching device.

When no current is passed through the coils, the force of attraction between the pole-pieces of a closely approaching permanent magnet and the iron core drives the rotor so as to bring it to the position of maximum attraction between them. As soon as the rotor moves beyond this position, the switching device switches on the power supply to the coils of the electromagnet and it gets actuated. Then a strong repulsive force between the pole-pieces of the electromagnet and that of the permanent magnet further drives the rotor in the same direction. As the process repeats automatically for each of the pole-pieces of the permanent magnets, the disc eventually gains higher and higher rotational speed and finally acts like a fly-wheel. A small dc generator coupled through pulleys with the shaft of the rotor generates a small amount of electrical power.

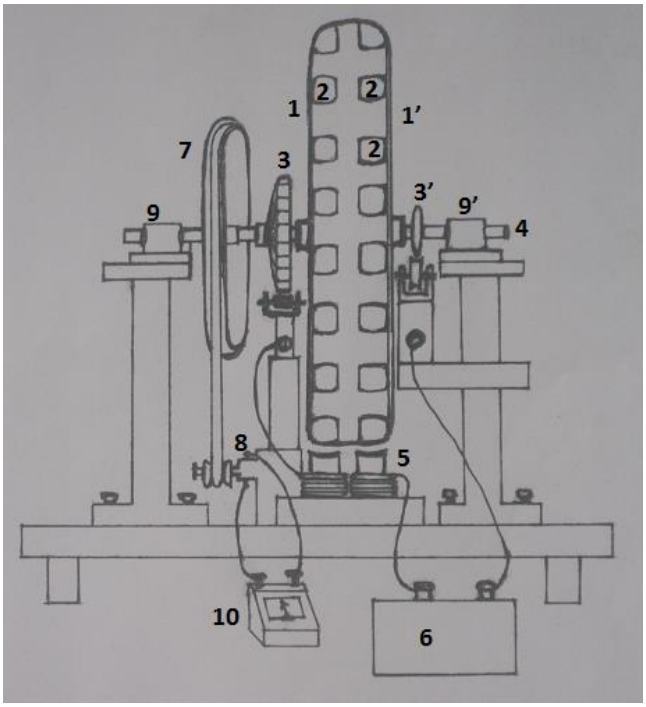

Figure 1. Schematic diagram showing the important components of the device for extracting energy from the permanent magnets. 1-1'-Bakelite discs, 2-polepieces of the permanent magnets, 3-3'-Switching system, 4-shaft, 5-electromagnet, 6-Battery (24 V), 7- pulley, 8- dynamo, 9-ballbearing housing, 10-ammeter.

When the rotor is in full speed, it is found to be revolving at a rate of 1.2 rotations per second. Since, the rotor contains sixteen magnets, and the electromagnet gets activated momentarily once for each permanent magnet per revolution, the electromagnet remains effectively switched on for $(1/19.2)^{th}$ part of a second. The total resistance of the two coils of the electromagnet is found to be 26 ohms. If the current flows through the coils in a continuous manner, the power consumption from a 24 V battery would be:

$$P = \frac{V^2}{R} = \frac{24^2}{26} = 21.6\ W$$

Since the currents flows through the coil for about $(1/19.2)^{th}$ part of a second, the actual power consumption must be smaller by a factor of 1/19.2. Therefore, the actual power consumed = $\frac{21.6}{19.2}\ W = 1.12\ W$. When the rotor of the device is coupled to a dynamo through pulleys, it produces a voltage of 10 $V$and a current of 125 mA. Or, the output power generated is equal to 1.25 W. Thus, it is quite evident that the output power produced by the device is

slightly greater than the input power. This, extra power definitely comes from the energy stored in the permanent magnets.

Although this home-made small model is rather crude and can produce only a small amount of electrical power, there do exists plenty of scope for its improvements. The principle of the technique employed in fabricating the device also seems promising since it works without any dictum of the Lenz's law, and, therefore, any performance efficiency can be achieved. It is envisioned that if a much larger version of the machine equipped with larger and more powerful permanent magnets and electromagnets with a clever design is constructed, the performance efficiency of the machine would increase to such an extent as to generate output energy far exceeding that of the input.

III. ENERGY GENERATION BY MAKING USE OF ANTIGRAVITY FORCES

Earth's gravitational force is well known to be eternal but primarily attractive. However, in specific situation, it may manifest itself into its own antigravity forces viz., the buoyant forces which could be exploited for energy generation. In designing and developing the contraption of energy generation, we are guided by the idea that if the buoyant force acting on a float and its up and down movements in accordance with the rise and fall of water level in a tank be transmitted through a lever and crank-shaft system to rotate a wheel, then it would be possible to generate some amount of mechanical energy, provided such movements of the float are maintained in sequential order by regulating the inflow of water into the tank and outflow of water from it.

The salient features of the working model for extracting energy from the earth's gravitational force is shown schematically in Figure 2. It consists of a working tank made up of plastic and is equipped with inlet and outlet water gates and a float which can freely move in upward and downward directions while floating on water. A big plastic bucket filled with water acts as a water reservoir. A controlled water drainage system is made by inserting a 10 cm diameter pipe at the bottom level of this reservoir and connecting this with a flexible pipe and a coupler to the inlet water gate of the working tank which is kept at a lower level by ~30 cm relative to the reservoir. The lifting up and coming down of the float with the rise and fall of the water level in the working tank is converted into movement of the arm of a lever. One end of the lever is coupled to a freely movable stem rod which is fixed symmetrically at the top of the float. The other end is coupled to a wheel in conjunction with a crank-shaft. A pair of mechanically operated devices is attached to the shaft of the wheel at proper positions to actuate the opening and closing of the water gates in sequential order. The device consists of a thick double circular disc whose each half circle has different radius of curvature. A lever, one end of which is equipped with a roller, slides on the rim of the disc and the other end of the arm is connected to the brass plate of the gate. When the arm of the lever slides over the rim of the disc of larger radius, it moves up and the brass plate gets lifted up, as a consequence. The arm of the lever remains in this position till the end of the arm slides on the disc of smaller radius. This makes the other end of the arm as well as the brass plate to go down hence closing the gate. At this time point, the second such device gets actuated to open the second gate from its closing position. The brass plates of both the gates moves up and down within the channels lubricated with grease.

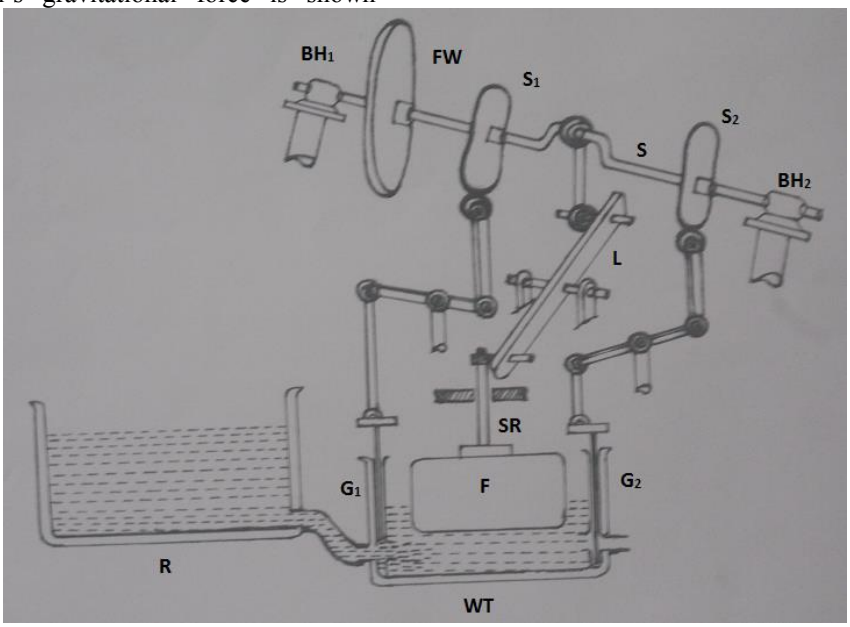

Figure 2. Schematic diagram of the contraption which makes use of the buoyant forces for energy generation. R-reservoir, WT-working tank, F-float, G_1-water inlet gate, G_2-water outlet gate, SR-stem rod, L-lever, S-shaft, S_1 and S_2 are mechanically operated gating system for G_1 and G_2, respectively, FW-flywheel, BH_1 and BH_2-ball bearing housings.

Since the sequence of operations (i.e., opening up of one gate while the other remains closed and vice-versa) is periodically repeated, the float in the working tank moves up and down periodically and makes the wheel to keep on rotating. However, any attempt to convert the mechanical energy into electrical energy makes the system to come to a halt. This is primarily attributed to the mechanical losses. The magnitude of the buoyant force that keeps the float moving up and down is also not sufficient enough to give any extra energy other than just to keep the system running. Moreover, all movements the system undergoes are rather slow. In order to keep the machine running, the reservoir of the system needs to be replenished by water to maintain its water level.

Although our laboratory working model is not sufficiently large enough to produce extra energy, it does demonstrate the possibility of generating energy by making use of the buoyant forces. Since the buoyant force that acts on a float is directly proportional to the surface area of the float, we can choose a float having an arbitrarily large surface area at our will. The energy output from such a kind of contraption could be enhanced to a great extent by proportionately increasing the dimensions of all the components, viz., the float, the working tank, the water reservoir, etc. It is concluded therefore, should a giant size machine of this kind be constructed, generation of quite a substantial amount of energy would be made possible.

It would be worthwhile to note in this context that the origin of the enormous amount of hydroelectric power being generated worldwide could be traced back to the cumulative effect of the buoyant forces that are operative at the molecular level. Being much lighter than the other constituent molecules of air, the atmospheric water molecules are continuously acted upon by a kind of buoyant force which slowly drifts the water molecules towards the upper levels of the atmosphere. Eventually, the water molecules reach to a height where the conditions become conducive for their precipitation and finally they come down to earth as rain and snow. Storage of water at higher altitude and converting the potential energy of the water stored into hydroelectric power is a known technology. It is of interest to note that in driving the water molecules towards the upper level of atmosphere, the gravitational field does work against its own attractive forces in a very subtle way, enabling us to generate a huge amount of hydroelectric power. Such plentiful of pollution-free energy is a great gift of nature to mankind that we perpetually harness without expending any input energy.

IV. ELECTRICITY GENERATION THROUGH ELECTROSTATIC INDUCTION

Electrostatic induction offers an easy and economic way to create charged bodies which can be subsequently be used for electricity generation. This is so because an almost unlimited number of charged bodies can be created from a single inducing charged body without any loss of inducing charge [6-9]. We have explored the possibility of constructing a simple electrostatic machine for electricity generation by making use of the phenomenon of electrostatic induction as the working principle.

An attempt has been made to construct a simple working model of an electrostatic machine for generating electricity. The machine consists of four (A, B, C and D) pieces of identical rectangular aluminium plates (of dimension 60 cm X 30 cm X 0.4 cm) which are pair-wise fixed on two bakelite plates symmetrically. One of the bakelite plates (of dimension 150 cm X 90 cm X 0.6 cm), which rests in perfectly horizontal position on rigid supports, constitutes the base plate. The other bakelite plate (of dimension 130 cm X 90 cm X 0.6 cm) is made freely movable with the help of a set of ball-bearing arrangement and it constitutes the top plate. The aluminium plates A and B of the base plate and C and D of the top plate face each other with a gap of ~0.2 cm in between them. The aluminium plates are fixed on the base plate symmetrically leaving 30 cm of Bakelite space open from both ends and a gap of 30 cm in between the two plates. While in case of the top plate the aluminium plates are fixed leaving a space of 10 cm from both ends and a gap of 30 cm in between them. All the aluminium plates have their individual electrical connection with flexible conducting wires.

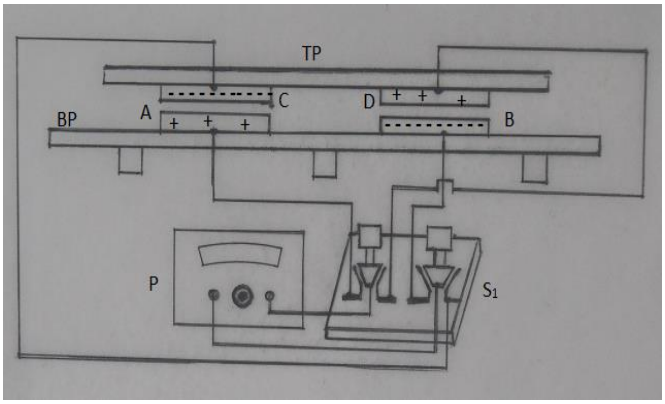

Figure 3a. Schematic diagram of the process employed for charging the metal plates through electrostatic induction. P-Variable voltage power supply, S_1- Manually operated electrical switch, BP-Base plate (Bakelite), TP-Top plate (Bakelite), A,B,C,D- identical aluminium plates fixed symmetrically on Bakelite plates.

Charging of the aluminium plates is done with the help of a variable voltage dc power supply as shown in Figure 3a. Position of the top plate is adjusted such that the plates C and D are just above the plates A and B

respectively. Under this condition, the wire connecting to the plates A and D are connected to the positive terminal of the power supply through switches. Similarly, the wires to B and C are connected to the neutral terminal of the power supply. The power supply voltage is then gradually increased up to 900 V. Both the plates A and D will be charged with positive charges while B and C will acquire negative charges, because the plates A & C and B & D will be acting as parallel plate capacitors. As the plates become fully charged all their connections to the power supply are switched off manually. Now, the top plate is displaced with the help of a step-down dc motor to one side such that the plates C and D arrive at the gap space of the base plate. At this point the power supply to the motor is switched off and another switch system connects the wires connecting to the plates C and D to a high voltage (1000 V) large value ~400 µF capacitor (Figure 3b). The discharge current due to these charged plates through the capacitor charges it. The top plate is then driven back so that the plates C and D get charged again. Then the above sequence is repeated and the capacitor is charged once more.

When the capacitor becomes almost fully charged, we can isolate it from the system and can use it as a source of electrical power. However, since the amount of charges initially accumulated on the plates A and B get diminished with time, we have to make use of the dc power supply from time to time for charging the plates. All the switches are fixed on the peripheral regions of the base plate and their positions are so adjusted that their sequential operations are linked up with the movement of the top plate.

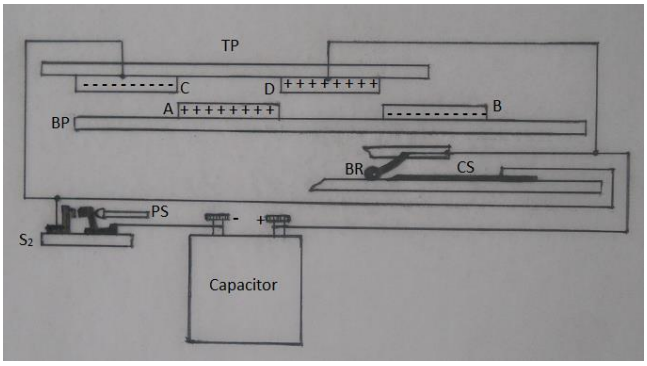

Figure 3b. Schematic diagram of the process employed for charging the capacitor due to the discharging current of the charged plates through it. BP-Base plate (Bakelite), TP-Top plate (Bakelite), A,B,C,D- identical aluminium plates fixed symmetrically on Bakelite plates, CS-Copper strip fixed on appropriate position on the base plate, BR-Brass roller which is connected to the top plate and rolls on the CS, S_2- Switching system for charing the capacitor.

V. CONCLUSION

In conclusion, we have explored the possibility of new ways of energy generation by employing some simple but innovative techniques. In this direction we are guided by the fact and also by our own firm belief that some of the forces of nature such as the magnetic forces, earth's gravitational forces and the electrostatic forces are eternal and inexhaustible and could be conceived as a store house of enormous amount of energy and there must be some ways to extract energy from these natural sources.

To achieve this goal, we have designed and fabricated three different types of working devices. But, these models are rather crude and suffer from imperfections. However, the amazing performance of these home-built models clearly demonstrates that the methodologies adopted for them have worked. Even at this preliminary stage we can say with a fair degree of confidence that should much larger size machines are constructed with cleverly improved design and equipped with more number of powerful magnets, floats having much larger surface areas, and much larger surface of the chargeable metal plates, then the energy generating capacity of the machines could be enhanced to a larger extent. It is towards this end our efforts are now being directed.

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